



Mongolian Emergency Service

Hospital Hygiene Project

MeshHp.mn

Occupational medicine

Mongolia 2011

Walter Popp, University Clinics Essen, Germany

1

Background

Health care facilities around the world employ over 59 million workers.

Healthcare workers (HCWs) are exposed to a variety of health hazards:

Biological hazards, e.g. TB, Hepatitis B and C, HIV/AIDS,

Chemical hazards, e.g. disinfectants, ethylene oxide, antineoplastic agents, anaesthetic gases, latex (in gloves causing allergies),

Physical hazards, e.g. noise, radiation, falls,

Ergonomic hazards, e.g. heavy lifting, musculoskeletal disorders,

Psychosocial hazards, e.g. shift work, violence, stress, burn-out.

2

Each year, 3 million HCWs worldwide are exposed to bloodborne pathogens through the percutaneous route:

2 million are exposed to hepatitis B,
900.000 to hepatitis C and
170.000 to HIV.

This results in 15.000, 70.000 and 1.000 infections, respectively.

Underreporting estimated 40-75 %.

More than 90 % of these infections in developing countries.

3

Needlestick injuries cause 95% of HIV occupational seroconversions.

They are preventable with practical and low-cost measures.

Infection with the hepatitis B virus is 95% preventable with immunization but less than 20% of HCWs in some regions of the world have received all three doses needed for immunity.



Prevention Basic principles

Occupational medicine and infection prevention and control may be performed by the same person in low resource countries.

In highly developed countries, different departments for occupational medicine and infection prevention and control are well established, also with different specialisations.

5

To reduce occupational risks to healthcare staff a specific approach is recommended:

Conduct a written risk assessment for staff, regarding physical, chemical, biological, ergonomic and psychosocial hazards.

Review the risk assessment annually to determine if the risks may have changed or whether there are additional risks.

Include an estimate of the degree of risk, e.g. low, medium and high (see tables for biological agent risks).

6

Table 1: Classification of “biological agents” 4 groups according to their level of risk of infection according to Directive 2000/43/EG of the European Parliament and of the Council.

Risk group	Description	Examples
1	biological agent that is unlikely to cause human disease	Bacteria in yoghurt yeast in beer
2	biological agent that can cause human disease and might be a hazard to workers; it is unlikely to spread to the community; there is usually effective prophylaxis or treatment available	Most bacteria Nearly all moulds Most viruses
3	biological agent that can cause severe human disease and present a serious hazard to workers; it may present a risk of spreading to the community, but there is usually effective prophylaxis or treatment available	Hepatitis B Hepatitis C HIV Tuberculosis
4	biological agent that causes severe human disease and is a serious hazard to workers; it may present a high risk of spreading to the community; there is usually no effective prophylaxis or treatment available	Lassa virus Smallpox

7

Endeavour to reduce the risks in the following order:

Eliminate the hazard whenever possible.

Use engineering controls (devices designed to remove or isolate the hazard).

Organisational measures - organise work so that exposure is reduced.

Personal protective equipment (PPE).

8

Eliminate the hazard whenever possible - examples:

Reduce injections and give more oral medication.

Assign a central hospital for treating highly infective patients (e.g. TB).

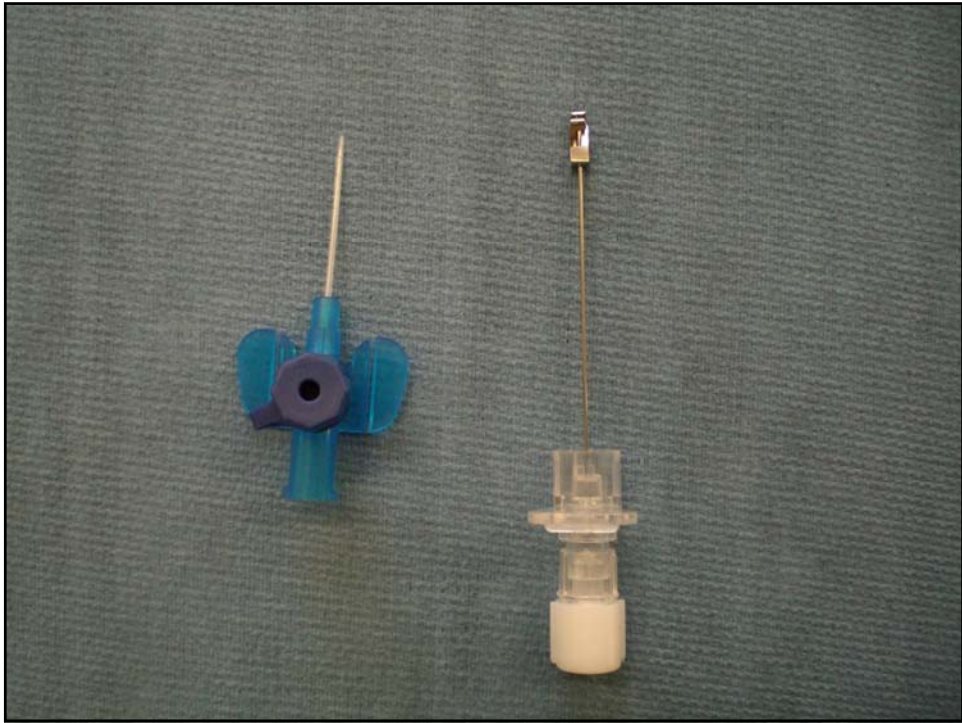
9

Use engineering controls (devices designed to remove or isolate the hazard) – examples:

When economically feasible and available use safety needles (single use needles designed to retract or cover the sharp end immediately after use).

Transport blood specimen in leak and puncture resistant boxes and use puncture resistant waste boxes for sharps and needles.

10

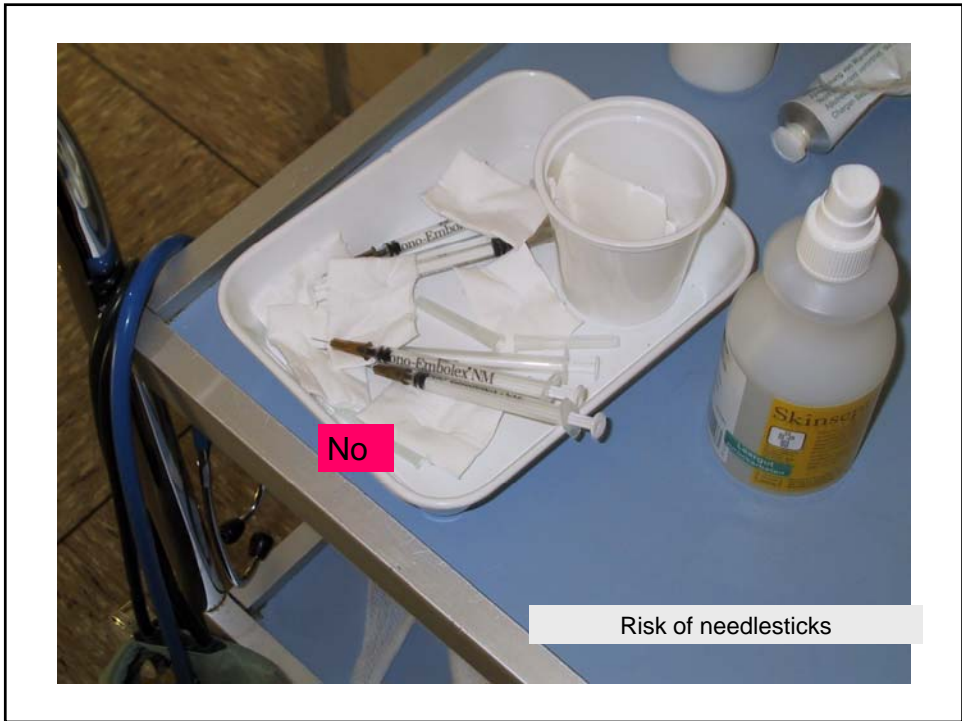




13











21



22



Organisational measures - organise work so that exposure is reduced. Examples:

Reduce the number of staff who care for a MRSA or TB patient.

Train staff regularly in safe working conditions.

Establish an occupational safety committee within the facility. In small hospitals this may be identical with the infection prevention and control committee.

Consider every patient to be potentially infected with hepatitis B or C or HIV and be prepared adequately – work as if every patient is infectious with strict adherence to standard precautions.

Audit periodically compliance with prevention measures.

24

Personal protective equipment (PPE) – examples:

Gloves: Discard and change between patients. Use only once whenever possible or disinfect 2-3 times maximum.

Gowns: Use if spills are possible, change between patients. Single-use gowns are preferred. If gowns are used several times, e.g. during a shift time, put on and remove without touching the outer contaminated side.

Eye goggles or face shields: Use if spills on the face are possible. Disinfect regularly and if visibly soiled.

Masks and respirators: Ideally, N95 respirators, that have a tight face seal should be used if there is a risk of exposure to airborne pathogen. If N95 respirators are not available surgical masks are the next best alternative, especially against droplet spread diseases. Self constructed and washable reusable textile masks have shown to provide some protection against SARS. Therefore, under severely limited resources, they may be a better alternative to doing nothing.

25



Reuse of single use gloves...

26








27

Respirator - mask

Type of mask	Minimum retention by filter (test with NaCl aerosol or Staph.au.) in %	Maximum of leakage if worn by persons in % (DIN EN 149)
FFP 1	80	22
FFP 2	94	8
FFP 3	99	2

Dreller et al. Gefahrstoffe Reinhalt Luft 66, 2006, 14

28



FFP masks with valves only for healthy staff to protect them, not infectious patients to protect them (e.g. immunocompromised patients)

FFP masks with valves never for Infectious patients (e.g. active TB, influenza) or Potentially infectious patients (e.g. contact patients to influenza cases).

29

Attention:
Masks should be thrown away at least after two hours, do not use them several times!



30

Develop written standard operating procedures for medium and high risks activities.

These may be identical with infection prevention and control procedures but should include staff protection activities and vaccination recommendations.

31

Provide an occupational medicine exam to all healthcare staff members:

Exam should include a physical examination and medical history (anamnesis) for all new staff, performed by an experienced physician who also is aware of individual data protection.

Results of the exam should be documented.

HCW staff examination records and other health information should be kept confidential and stored in a secure place.

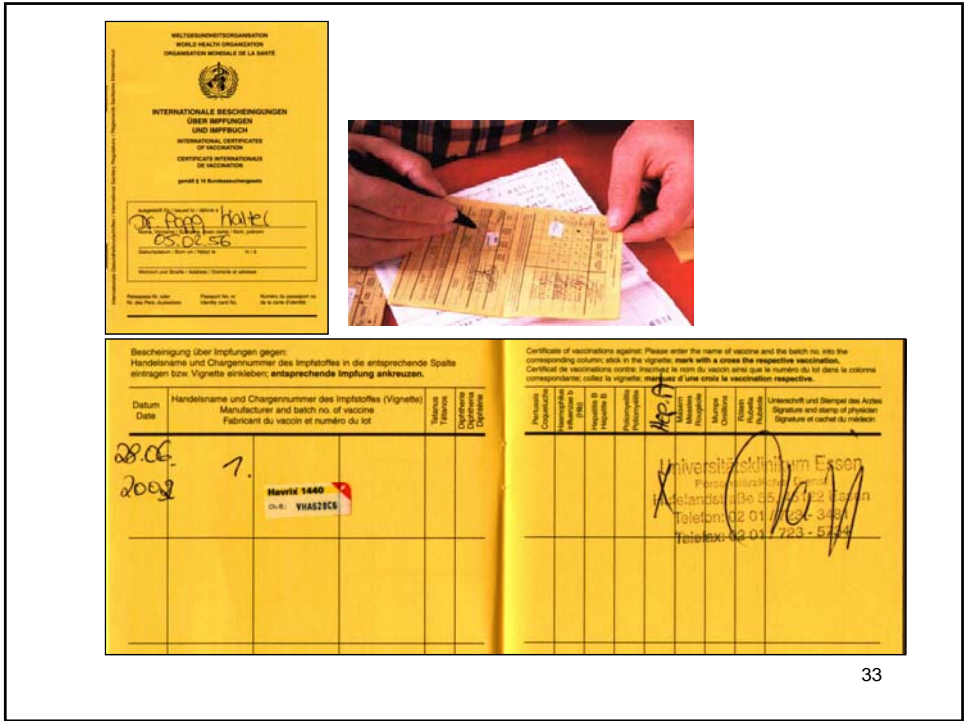
Provide vaccination to all staff that need them. Vaccination is strongly recommended for all non-immune HCWs:

Hepatitis B virus, Influenza virus,
Mumps/Measles/Rubella/Varicella/Pertussis (specially for staff in childrens' departments),
Poliovirus,
Tetanus, Diphtheria (as routine adult vaccination).

All injuries should be documented in the respective staff member medical record.

Repeat the examination periodically, e.g. every 3 years





33

Low resource countries

In low resource countries, special interest should be given to prevention of bloodborne infections from needlestick injuries.

The two most important causes of needle stick injuries are
 Recapping of needles and
 Unsafe handling of sharps waste.

Other causes include:

- Overuse of injections and unnecessary sharps,
- Lack of supplies (disposable syringes, safer needle devices, sharps-disposal containers),
- Lack of placing needles in sharps containers immediately after injection,
- Understaffing,
- Passing instruments from hand to hand, e.g. in operating theatres,
- Lack of awareness of the problem and lack of training.

34

Low resource countries

Hepatitis B,
hepatitis C,
HIV and
Tuberculosis
pose the greatest risk of infection to HCWs in low
resource countries.

35

The risk of transmission from an infected patient to a
HCW by a needlestick injury is around

30 % for hepatitis B,

3 % for hepatitis C and

0.3 % for HIV.

36

After each needlestick or sharp injury:

A co-worker should immediately be called to help.

Ideally a skin wound should be disinfected using alcohol or alcohol hand rub (use of alcohol will cause pain).
If alcohol is not available, wash extensively with soap and water.

For mucous membrane, in most cases only water douching may be realistic (alternatives: iodine, chlorhexidine or octenidin preparations).

After disinfection the risk of transmission should be assessed. The risk may be increased with deep wounds, visible blood on the device, a blood-filled needle and a high viral load status of the index patient (if available).



37

Hepatitis B:

Risk of infection with hepatitis B can be avoided by vaccination.

Postexposure prophylaxis (PEP) is dependant on vaccination and immunity status of HCW. The following recommendations can be used independent from the status of the source:

Unvaccinated HCW should receive both HBIG (hepatitis B immune globulin) + HB vaccination;

Previously vaccinated and known responders HCWs: no treatment;

Previously vaccinated, known non-responders HCWs should receive both HBIG + HB vaccination (second vaccine series);

HCWs whose antibody response is unknown: test and administer HBIG + HB vaccination if results are inadequate (<10mIU/ml).



38

Hepatitis C:

There is currently no recommended PEP.

Perform baseline and follow-up testing for anti-HCV and alanine aminotransferase (ALT) up to six months after exposure.

Perform HCV RNA at four to six weeks if earlier diagnosis of HCV infection desired.

Hepatitis C should be treated after seroconversion.

39

HIV:

PEP against HIV should be started as soon as possible preferably within 2-24 hours.

Do not start a PEP after 72 hours.

Issues with HIV PEP:

Proven transmission is only possible using PCR testing which is only available in highly developed laboratories,

PEP must be given within hours of exposure,

Contraindications (pregnancy) should be considered,
There are a high rate of side effects (and a high rate of dropouts in taking the drugs),

Medication must be taken for a long time (4 weeks).

40

HIV PEP may be not a realistic option in many low resource countries, therefore, attention should be given to using PPE to avoid injuries.

Seek expert consultations if viral resistance is suspected.

In case no PEP is given:

Perform HIV-antibody testing for at least six months post-exposure (e.g. at baseline, six weeks, three months, and six months).

Perform HIV antibody testing if illness compatible with an acute retroviral syndrome occurs.

Advise exposed persons to use precautions to prevent secondary transmission during the follow-up period.

41

Tuberculosis:

Measures used in industrialized countries to control nosocomial (healthcare) TB transmission (ventilation systems, isolation rooms, personal protective equipment) are often beyond the resources of low-income countries.

In these settings the following measures may help reduce the risk of transmission:

Establish a TB control committee.

Increase awareness about TB among HIV-positive patients.

Place patients with suspected TB or with an abnormal chest radiograph in an isolation room with door closed and a ventilation system (natural or artificial).

Restrict sputum induction procedures and aerosolized pentamidine treatments to TB isolation rooms.

Assign adequate number of well trained staff in mycobacterial laboratories to perform routine and urgent acid-fast bacilli smears on daily basis.

Initial anti-TB regimen should include four drugs.

Patients in TB isolation rooms are allowed to leave their rooms only when medically necessary and ensure that such patients always wear a surgical mask when outside the room.

42

Place automatic closing devices on all TB isolation room doors.

Install negative pressure in all TB isolation rooms or increase natural ventilation of the rooms.

Continue isolation of TB patients until at least three negative acid-fast bacilli sputum smears are obtained.

Forbid immunocompromised staff from contact or caring after tuberculosis patients.

Ensure that all health care workers entering a TB isolation room wear a N95 mask (or – if not available - at least a surgical mask).

Routine tuberculin testing is performed for tuberculin negative staff. In case of tuberculin conversion: Rule out active tuberculosis and treat HCW for latent TB infection.

Each HCW has to inform the designated attendant of the TB control committee if a cough for longer than 3 weeks has not responded to a course of antibiotics.

Treat HCWs as soon as active TB is confirmed.

43

Table 2: Risk evaluation for infectious agents in health care settings

•Risk classification according to Directive 2000/54/EG.

Please get the table from this url address

<http://meshhp.mn/downloads/Occupational%20medicine%20-%20table.pdf>

Infection	Transmission in general	Risk evaluation		Risk classification of biological agents *	Main risk	Vaccine available	Post exposure prophylaxis
		Staff to patient	Patient to staff				
Cholera	Fecal-oral, contaminated water	rare	rare	2	Stool contact	+	
Hepatitis A	Person-to-person by fecal-oral route; infected food handlers with poor personal hygiene can contaminate food.	rare	rare	2	Stool contact	+	Immune globulin
Hepatitis B	Via percutaneous, mucosal, and nonintact skin contact with blood, semen, vaginal secretions, and bloody fluids.	low	Moderate	3	Needlestick injury	+	Immune globulin (HBIG)
Hepatitis C	Same as for Hepatitis B.	low	Moderate	3	Needlestick injury	-	-

44



Mongolian Emergency Service
Hospital Hygiene Project

MeshHp.mn

Thanks!